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MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2016/2017

TDB2121 – DATABASE DESIGN AND MANAGEMENT (All sections / Groups)

7 MARCH 2017
2.30 p.m. – 4.30 p.m.
(2 hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of **6 QUESTIONS** with **TWO** sections only.
2. Attempt all questions in **Section A** and attempt **TWO** out of **THREE** questions in **Section B**.
3. If you attempt all questions in Section B, only the first two questions are considered.
4. You are allowed to use calculators in this examination.
5. Please print all your answers in the Answer Booklet provided.

SECTION A: Answer ALL (30 marks)**QUESTION 1**

Productive Bank launches a lot of investment projects besides providing normal bank services. The director, Mr. Kelvin Lawrence needs a data warehouse to optimize the investment report. He wants to know the investment amount, investment currency, total number of investors and amount invested in each project. This report is important for the bank to decide whether to continue a project, launch the project phase by phase or stop the project. Below is the relational schema of Productive Bank:

Investor (InvestorID, FirstName, LastName, Contact, Email) with 500 records.

Account (AccountNo, AccountLocation, AccountStatus) with 550 records.

Time (TID, TDate, TDay, TWeek, TMonth, TQuarter, TYear) with 365 records.

Currency (CurrencyID, CurrencyCode, Country) with 100 records.

Project (ProID, ProTypeDescription, ProTitle, ProStartDate, ProEndDate, ProStatus, ProTargetAmount) with 50 records.

- (a) Identify THREE new attributes to be included in the fact table. [1.5 marks]
- (b) Design and illustrate a star schema that suit to Mr. Kelvin requirement about the investment fact. [5.5 marks]
- (c) Estimate the number of rows and the size of field based on the schema you have designed in b). Assume that your fact table has 8 fields and each field has 4 bytes in length. [3 marks]

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QUESTION 2

(a) Mr. Pang, Chief Executive Officer of ScoreGreat Tuition Centre wants to implement object oriented database model. The centre has the following business rules.

- Each student may have many registrations. Each registration is owned by a student.
- Each tuition class has one and only one instructor. However, each instructor may have many classes.
- Each tuition class has many registrations. Each registration is linked to a class.

Please illustrate the object oriented database design through Unified Modeling Language (UML) Diagram. For each entity, you must identify **TWO** related attributes. Please illustrate the UML diagram with all the necessary components.

[6 marks]

(b) Distributed database has been successfully implemented in TravelEverywhere Sdn. Bhd. The Chief Technology Officer, Mr. Zamri is wondering whether data replication is needed as well. The company has no problem with the storage space, but Mr. Zamri does concern about the complication in maintaining the database. Based on the usage report, high access occurs on some tables such as holiday products and complaint progress. When high usage occurs, the information generation is slow. Assume that you are the senior database administrator in the company,

- (i) Describe at least **TWO** advantages and **TWO** disadvantages of having data replication. [2 marks]
- (ii) In your opinion, which replication scenario is suitable for the company? Please justify. [2 marks]

Continued...

QUESTION 3

(a) Table RNASEq shows the data of RNA-sequencing. Create RNASEqList.xml document based on Table RNASEq. [4 marks]

RNASEq

TranscriptID	ChrName1	GeneName1	GeneChromStart	GeneChromEnd	KogDesc
30535932	Chr08	Glyma.08G252600	22181948	22201676	Zn-binding protein Push
30489703	Chr04	Glyma.04G224400	49491086	49495076	Zinc-Binding oxidoreductase

(b) Assume that you are the senior database administrator (DBA) of a company. You need to let the junior DBA well understand about the roles as a DBA.

(i) Explain the managerial roles with example. List out at least FOUR roles. [4 marks]

(ii) Security breaches will corrupt the whole system. Thus, it is important to enhance database security and minimize losses. Please describe TWO possible threats with examples to the junior if security is not well managed. [2 marks]

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SECTION B: Attempt TWO out of THREE questions (20 marks)

Questions in Section B are based on the following entities of a blood bank management system. SQL commands are needed to solve the problems in this section. Please attempt **TWO** out of **THREE** questions.

- Donor (D_IC(PK), D_FName, D_LName, D_Gender, D_Age, D_Race, D_Contact, D_Address, D_Email)
- Blood (Blood_ID(PK), Blood_Date, Blood_Group, Blood_RhD, Blood_Units, Blood_TestResult, Blood_TestDate, Blood_TestDescription, Blood_ExpDate, D_IC(FK))
- Products (Pro_ID(PK), Pro_Category, Pro_Unit, Blood_ID(FK))
- Order (OrderID(PK), OrderDate, OrderUnit, Pro_ID(FK), HosID(FK))
- Hospital (HosID(PK), HosName, HosContact, HosInChargePerson)

QUESTION 4

During the initial development of the database, constraints and condition setting of each table are important. Please solve the problems below with proper data definition language.

(a) Create table Order using SQL command with the following conditions:

- Check the existence of Order table.
- Let the OrderID increase automatically by one and the number starts from 1000.
- Have the constraint check where OrderUnit should not go below 40ml.
- OrderDate must contain values
- Let the foreign key Pro_ID and HosID: when the record in parent table is updated, it will update as well; when the record in parent table is deleted, restrict the delete action. An example value of Pro_ID is: P0101; for Hos_ID is: H02000.
- Design the table with appropriate data types.

[6 marks]

(b) Assume that the donor table has been created. However, the user wants the first name and last name to be concatenated and form new attribute called D_Name. How to achieve this through SQL command? [4 marks]

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QUESTION 5

Assume that the database is in use now. Based on user requirement, please solve the problems below with proper SQL command.

(a) Hospital Sayang has ordered product with category 'platelets' and 'red cells' on 16 November 2016. The person in charge of the hospital requests the blood bank to display the order information for record purposes. This record must include hospital name, order id, date and unit, product category, and blood id. Assume the date format is DD/MM/YYYY. [5 marks]

(b) A report is needed where left join must apply to tables Blood and Products. During JOIN, please **EXCLUDE** the test information and donor IC. [2.5 marks]

(c) By using SQL command, please display the number of orders, hospital name and order date by grouping the records according to product category. [2.5 marks]

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QUESTION 6

Some commands are invoked upon user requests, such as view and procedural SQL. Please solve the following problems with procedural SQL or view.

- (a) Assume that table TableLog has been created with attributes: ID, BloodID, TestDescription, DateChange, and Action. Write a trigger before table Blood is updated, a log record will be inserted into TableLog. [5 marks]
- (b) A view must be created for blood test records so that the tester CANNOT see the donor IC. Make sure the records are sorted according to test date in descending order. [3 marks]
- (c) Create a stored procedure called DisplayDonor which display the donor name and IC when blood group and blood RhD are received as inputs. Assume data type for blood group and blood RhD is Varchar. [2 marks]

End of Paper.